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MONTHLY REVIEW

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American Electro-Platers Society

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A SWARM OF BEES WORTH HAVING

B patient, B prayerful, B humble, B mild,
B wise as a Solon, B meek as a child;
B studious, B thoughtful, B loving, B kind,
B sure you make matter subservient to mind.
B cautious, B prudent, B trustful, B true,
B courteous to all men, B friendly with few.
B temperate in argument, pleasure and wine,
B careful of conduct, of money, of time.
B cheerful, B grateful, B hopeful, B firm,
B peaceful, benevolent, willing to learn;
B courageous, B gentle, B liberal, B just,
B aspiring, B humble, because thou art dust.
B patient, circumspect, sound in the faith,
B active, devoted, B faithful till death;
B honest, B holy, transparent and pure,
B dependent, B Christlike, and you'll be secure.

—The Pathfinder.

CHICAGO BRANCH NUMBER

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Editors' Office, 4156 Botanical Ave., St. Louis, Mo.

Vol. 8 MARCH No. 3

ADDRESS OF PRESIDENT OF CHICAGO BRANCH AT NINTH ANNUAL BANQUET, HELD JAN. 29, 1921.

It has been said that next to the National Convention of the American Electro-Platers' Society, the Chicago Branch banquet has become the most important event of the year, and we believe there is more or less justification in this impression which seems to prevail. We believe that the character of the past events of this kind bears out this impression, and I am sure it will be maintained this evening after you have listened to the gentlemen who have so kindly volunteered to be with us to present to you matters of vital importance to the Plating Industry.

When I assumed the office of President of Chicago Branch, it was with a feeling that a special honor had been conferred upon me, and that all the members were solidly behind the purpose of keeping up the growth and progress of the Branch. My faith in this determination and loyalty has been more than rewarded.

It has been my privilege and pleasure for the past several years to watch the growth and accomplishments of the branch. It has only been a very short time since the membership of the branch was less than one hundred. At the present time our total membership is 152. This steady and substantial growth is due to the fact that the platers are getting to realize more all the time the benefits that can be derived from membership in the American Electro-Platers' Society, and that it is a benefit not only to the platers themselves but to their employer as well.

We feel justly proud of the fact that Chicago has given to the Society two Supreme Presidents, one of whom is with us and will address you later; one Supreme Secretary-Treasurer, and two Editors. We still have ample material, especially among the new and younger members who have the ability and ambition to serve the Society as a whole and to honor Chicago Branch in particular.

Our educational program at our monthly meetings is always an interesting page in our Review, and the splendid spirit of co-operation thus far displayed during the present administration justifies the hope on my part that we shall continue in the front rank of the progress of the Society as a whole, if not the actual leader.

C. E. THORNTON,

POLARIZATION, CLEANERS, AND HYDROFLUORIC ACID IN NICKEL SOLUTIONS.

A Discussion at the Ninth Annual Banquet of Chicago Branch, American Electro-Platers' Society.

By Oliver P. Watts*

I have been asked to speak this evening on three different topics, the first of which is "Polarization in Plating Solutions." Polarization is a much-abused term, and there is a greater disagreement concerning the definition of it than in regard to any other term used in electro-chemistry. At the outset it will, therefore, be necessary to agree upon a definition of polarization. Let us define it as **any change in the actual E.M.F. of a cell caused by the passage of a current through it.**

When two unlike electrical conductors, such as copper and zinc, for example, are put into the same electrolyte there is a difference of potential between them, the magnitude of which depends on the chemical nature of the electrodes and of the electrolyte. If this difference of potential is large enough to be useful, we call the combination a voltaic cell, and may use it as a source of electric current. When current is drawn continuously from any voltaic cell, sooner or later there will be a falling off in its E.M.F. This falling off in E.M.F. is one variety of polarization.

In contrast to the voltaic cell, which as a result of chemical changes that take place in it, supplies us with electrical energy, there is the electrolytic cell, in which chemical changes are caused to take place by passing a current of electricity through it. The voltaic cell is a device for transforming chemical into electrical energy, and the electrolytic cell reverses the process. All plating solutions, and those used for the refining of copper, gold and silver, are examples of the electrolytic cell. Another electrolytic cell is that used for the manufacture of oxygen and hydrogen by passing current through a solution of caustic soda with electrodes of iron. At the outset, before any current has passed, the cell shows no E.M.F. because there is no difference between the two electrodes. But the passage of current causes oxygen to collect on the anode and hydrogen on the cathode, so that the electrodes are no longer the same, and the cell now has a voltage of its own of about 1.7 volts—that is, a polarization or change of E.M.F. of 1.7 volts has taken place.

In the electro-plating tank with soluble anodes as usually used, after current has passed long enough to completely cover the objects with the metal which is being deposited, both anodes and cathode are of the same metal, and consequently there is no polarization. This is the normal and proper condition of operation. If, however, the anodes are not corroding properly, i.e., they corrode at less than 100 per cent efficiency, a portion

*Wisconsin University

of the current is liberating oxygen, chlorine, or some other foreign substance on the anodes so that they differ from the cathode, and this difference in materials causes an E.M.F. to exist between anodes and cathode when the current has been cut off—that is, polarization occurs. Similarly the deposition of hydrogen along with a metal in plating causes polarization.

Of what significance is polarization to the plater? The ideal plating solution would be one in which the anodes dissolve, and metal is deposited at the cathode at an efficiency of 100 per cent, i.e., the entire current is spent in dissolving metal from the anodes and depositing it at the cathodes, the metal content remains unchanged, and there is no oxygen or hydrogen evolved. In such a case one might expect that there would be no polarization at all, but a voltmeter reading taken as soon as the plating current is cut off, usually shows 0.01 to 0.02 volt E.M.F. between anodes and cathodes. The cause of this voltage is a difference in concentration between those portions of the electrolyte with which the anode and cathode make contact. As the cathode metal is being removed, and the concentration of the electrolyte there is less than that of the main body of the electrolyte, while at the anodes metal is being added and the concentration here is higher than elsewhere. This difference in concentration of the electrolyte is capable of causing a small E.M.F. even though the electrodes themselves are exactly alike. In plating solutions, then, we may expect to find the polarization varying between 0.01 and several tenths of a volt. A measurement of the amount of polarization is the quickest way of learning whether or not the anodes are corroding at a good efficiency, for the higher the polarization, the poorer is the anode corrosion. Aside from this, the plater has no interest in polarization.

Hydrofluoric Acid in Nickel Solutions.

The second topic which I have been asked to discuss is "Hydrofluoric Acid in Nickel Solutions." The effect of adding hydrofluoric acid or a fluoride to nickel baths may be expected to vary, depending on whether or not boric acid is present; for in the presence of this, it is generally thought that a fluoborate is formed. The discussion should, therefore, include what is known of the effect of fluorides and fluoborates in nickel solutions.

The first published account of the use of nickel fluoborate as a plating solution seems to have been by Kern and Fabian* in 1908. At 12 ampres per square foot they obtained an excellent, bright, malleable deposit, 6/16 of an inch thick, but stated that this was not quite so smooth as that from a fluosilicate solution which they tested at the same time.

During the preparation of this paper the writer recalled that many years ago he tried nickel fluoborate, and a search of

*School of Mines Quarterly, Vol. 29, P. 367.

his laboratory note-books revealed among experiments on a large number of unusual nickel salts tested as plating baths between November, 1907, and January, 1908, that nickel fluoborate was used alone, and with the addition of glycerine. The latter gave a brilliant, but rather brittle deposit, and seemed promising as a bright-nickel solution. Both were recorded as promising solutions for further study; but, like so many things that are laid aside to be finished in some day of leisure; the investigation was never completed. Later a half gallon of the solution containing glycerine was added to a 25-gallon nickel bath of the double sulphate. After operating this solution for several days, a sheet of copper was hung in the tank and plated continuously for 80 days at 8 amperes per square foot. The deposit here shown is of remarkable smoothness for a thickness of 5/8 of an inch in the center and 7/8 of an inch on the edges. This shows that it is not necessary that the entire solution be a fluoborate, but that a small proportion added to other salts may produce good effects.

In 1912 A. Hollard* used a solution of nickel fluoborate very carefully neutralized, and claimed that nickel deposits of any thickness could be made from this solution, and that it was particularly suited to making electrotypes. In the same year a student in my laboratory found accidentally that a good nickel deposit could be obtained from a solution of nickel fluoride strongly acidified by hydrofluoric acid. Hydrofluoric acid acts differently from a sulphuric or hydrochloric acid, for any considerable quantity of these reduces the current efficiency tremendously by causing hydrogen to deposit instead of nickel, and also causes the deposit of nickel to be very hard and brittle, and to peel off. Because of the comparative weakness of hydrofluoric acid—that is, the small extent to which it dissociates into hydrogen ions—it is possible to add considerable amounts of it without causing the disagreeable results of adding a chemically equivalent quantity of sulphuric acid. It is because boric acid, one of the weakest of acids, possesses this property to a still greater degree that it is now so generally used in nickel solutions. It dissociates to such a slight degree that a large amount of it may be added without imparting more than a faint acidity to the solution, yet the great quantity present insures that the solution will not become neutral or alkaline for many months.

In spite of these favorable experiments with both nickel and fluoride and fluoborate, no particular attention seems to have been given to either of these solutions for a number of years. The present interest in them is apparently due to the remarkable results claimed by E. G. Lovering* for his "magic fluid," as he calls the hydrofluoric acid which he adds to his nickel solution. He states that the addition of 1¼ ounces of hydrofluoric acid per gallon of a nickel bath which contains boric

*Brass World, 1912, P. 391.

acid greatly improves anode corrosion, and that he can put on from this solution, heated to 60° C. (140° F.) more nickel in 5 minutes than he can from a standard nickel solution in a half hour; but he does not say whether or not the standard solution was heated. If the standard solution was not also heated, the difference in rapidity of plating was mainly due to heat, and can be obtained by heating any good nickel bath. The improvement in anode corrosion brought about by adding hydrofluoric acid is the natural result of acidifying the solution rather strongly, and is not confined to hydrofluoric acid or to nickel solutions.

In The Brass World for November, 1920, F. J. Liscomb gives the results of experiments with both a single and a double fluoborate solution. The former showed an efficiency of deposition of 81 per cent, and the latter 95 per cent after some of the free acid had been neutralized—when the anode corrosion was only 51 per cent. Both deposits appear to have been good, but these experiments disclose nothing particularly favorable to the fluoborate solution.

In The Monthly Review for November, 1920, Dr. Blum advocates neutralizing the hydrofluoric acid before adding it to the nickel bath, and states that from a solution containing 34 ounces of the single sulphate of nickel per gallon, with 10 per cent of the metal present as fluoborate, he gets good deposits at a higher current density than when the fluoborate is replaced by a corresponding amount of nickel chloride, and that the efficiency of deposition from both solutions is nearly 100 per cent. He also states that in the absence of boric acid the addition of hydrofluoric acid is not beneficial. The observed high efficiency of deposition is to be expected from neutral baths so high in metal as these.

At the meeting of the Pittsburgh Branch referred to on page 21 of the same issue, Edgar Cornell reported tests of Lovering's solution to show a current efficiency of 51 per cent at the cathode and 100 at the anode, and that the anodes remained bright and clean. This is just what would be expected from a nickel solution which contains a considerable amount of a moderately strong acid.

To sum up:

1. Nickel fluoborate and solutions of nickel sulphate containing fluoborates gives an excellent nickel deposit.

2. If neutral, the efficiency of deposition is nearly 100 per cent; if strongly acidified this may drop as low as 50 per cent.

3. Anode corrosion is increased by addition of hydrofluoric acid, while resistance of the solution and efficiency of deposition are lowered.

4. The beneficial effects of hydrofluoric acid seem to be due to the formation of a fluoborate.

5. The reports so far made on the effects of hydrofluoric acid and of fluoborates in the nickel solution are too incomplete and contradictory to say with certainty that these are a great improvement, although it would seem that nickel fluoborate makes a very good nickel bath. Further investigation is needed to establish the exact value of hydrofluoric acid or of fluoborates in nickel plating.

Theory of Cleaners.

The third topic on which I have been asked to speak is "The Theory of Cleaners." I shall confine my remarks on the cleaning of metals to the removal of grease and oil left on articles from polishing or in manufacturing processes.

The oils, fats and greases met with in plating may be divided into two classes: Those which are saponifiable and can be converted into soap by the action of a hot, dilute solution of caustic soda or caustic potash, and those which are unsaponifiable, and hence cannot be directly removed by alkalies. Animal and vegetable fats belong to the first, and mineral oils and greases to the second class. Since a mixture of the two is frequently encountered in the plating room, it is necessary that the plater have means of removing both.

The early method of removing unsaponifiable grease and oil was by organic solvents such as benzine, gasoline, carbon tetrachloride, etc. In additoin to the cost of the solvent and expense of recovery, all of these except carbon tetrachloride are inflammable, and their use causes a serious fire hazard. The use of such solvents has been rendered unnecessary by the discovery that, although mineral oils cannot be saponified and rendered soluble by the action of hot alaklies, as is the case with vegetable and animal fats, they can be emulsified by hot alkaline solutions which contain a small quantity of soap, and thus removed from metal surfaces. This discovery has revolutionized the cleaning of metals.

An emulsion consists of microscopic drops of one liquid suspended in another in such a way that they do not separate or settle out on long standing. Milk and mayonnaise salad dressing are examples of emulsions. In order to emulsify grease and oils it is not necessary to use the soap with solutions of the caustic alkalies, for carbonates such as soda ash or sal soda work just as well, and at a less cost. In the valuable paper on metal cleaning by E. C. Scott in The Monthly Review for August, 1917, he states that instead of adding soap directly, rosin may be substituted and the soap will then be formed in the solution. He says: "The solution used by several large operators is 8 ounces of soda ash and 8/10 of an ounce of rosin per gallon of solution. Other colloidal substances may be substituted for soap in the emulsification operation, as they have very much the same action. Two of these which have commonly been used are sodium silicate and sodium aluminate. In general, however, soap is a better emulsifying agent and can be used at a lower cost than these other alkali salts."

It would appear from the above statement that the cleaning power of all these solutions is attributed to their alkaline nature. In order to learn more about the mechanism of such cleaning, the writer experimented with a number of different insoluble powders, adding 2/3 of an ounce of each to a boiling solution of 8 ounces of soda ash per gallon of water. The list which follows is arranged in the order of their effectiveness in removing vaseline and mineral lubricating oil from polished copper and nickel plate:

List of Substances Tested.

1. Aluminum oxide.
2. Sodium silicate.
3. Talc.
4. Precipitated chalk.
5. Barium carbonate.
6. Strontium sulphate.
7. Magnesium carbonate.
8. Chromium oxide.
9. Barium sulphate.
10. Rutile (titianium oxide).
11. Lampblack.
12. Starch.

Of all the list, starch is the only substance which does not show some cleaning action. For removing vaseline the first five substances in the list were much more effective additions to the soda ash solution than soap. In order to see if the cleaning was due to the alkalinity caused by the soda ash, aluminum oxide and talc were tried in pure water, and were found to clean almost as quickly as in the soda ash solution. Alkalinity does not seem to greatly affect the rate of cleaning.

There was a great difference in the fineness of the different materials, for they were used just as taken from the chemical stock room. It was noticed that, with the exception of starch and lampblack, the substances which were least effective in cleaning were the coarser, and in consequence considerable portions of these remained on the bottom of the container, in spite of agitation by a jet of air. Agitating the metal seemed to help cleaning whenever tried.

Although these experiments were not sufficiently extensive to enable hard and fast conclusions to be drawn, it seems probable that the cleaning effects observed are due, not to the chemical nature of any substance, but to the mechanical action of the suspended particles striking against the metal surface. The complete failure of the starch, and the slight effect of lampblack, in both of which cases the number of suspended particles must have been enormously greater than with any of the other substances, is probably due to the extreme fineness and lightness of their particles. The essential for cleaning seems to be a powder fine enough so that most of it may be kept in suspension, yet of high enough density to have an abrasive effect on grease. Whether a particular material is more effective when chemically precipitated, or when mechanically pulverized to the same degree of fineness, is a question which can be answered only after careful and more extended experiments than those here reported.

The Electric Cleaner.

One of the greatest advances in the process of removing grease from metal was the introduction of electric cleaning. The electric cleaner may consist of any good conducting electrolyte which does not yield a deposit of metal on the continuous passage of current. In so far as cleaning alone is concerned, a solution of any sodium or potassium salt might be used as the electrolyte; but for cheapness and convenience it is desirable to use the tank itself as anode, hence the employment of alkaline solutions in which iron acts as an insoluble anode.

When articles to be cleaned are hung as cathodes in a solution of lye or sodium carbonate and current passes, hydrogen is liberated on the surface of the metal underneath the grease and pushes the latter off. At the same time a film of sodium hydroxide (lye) is formed on the metal; this probably helps to a slight extent to saponify such animal or vegetable fats as may be present. However, the few seconds required for a good electric cleaner to remove grease from a metal is insufficient for saponification to be very effective, so most of the cleaning must be due to the current, and not to the film of lye.

The higher the current density, the more rapidly hydrogen is liberated and the quicker the cleaning. In order to obtain a high current density at a pressure of only 6 volts the electric cleaning solution should be used hot, and the cables from the generator to the cleaning tank should be copper of large cross section.

Lye or sodium carbonate (soda ash) is most frequently used as the basis of electric cleaning solutions, to which other materials are often added. Formerly cyanide was frequently added to electric cleaning solutions, but it is now seldom used. Any of the solids previously mentioned as assisting to remove mineral oils may be added with advantage, in which case the solution should be agitated with air or by boiling so that the solid remains in suspension. With a hot solution at a high current density cleaning is accomplished in 5 to 30 seconds, and it is best to remove work shortly after it is clean. The effectiveness of any of the ordinary cleaners can be greatly increased by the use of the electric current. Some platers use their electric cleaning solutions cold, but to do so is to lose much of their effectiveness, because of the greatly lessened current.

Excessive accumulation of dirt in an old electric cleaner is nearly as fatal to uniformly good results as in cleaning without the current. The cleaner should be kept clean or renewed with suitable frequency. If a great amount of especially dirty work is handled two electric cleaners will probably be an economy—the work, after a few seconds in the first cleaner, being rinsed hot and the cleaning finished in the second cleaner, which will remain clean for a long time, since very little grease finds its way into this. My own experience with electric cleaners has been so satisfactory that I cannot understand how any plater can be content to do cleaning without one.

SUCCESSFUL METHODS.

Question No. 1. How can a gun metal finish be put on steel without copper plating?

Answer. One method offered was to Parkerize the article, another was to immerse in a boiling solution of caustic soda and sodium nitrate for about one-half hour. It was stated that this would produce a nice black.

Question No. 2. Is hydrocyanic acid used in old cyanide solutions?

Answer. It has been used but better success has been had by the use of barium cyanide as this will precipitate the carbonates.

Question No. 3. What is considered the proper amount of sodium chloride to use in a nickel solution containing 2.5 ozs. metal per gallon?

Answer. New solutions contain about 1 oz. of sodium chloride to 1 oz. of metal but in old solutions that are sluggish it is better to start off with about ¼ oz. to gallon until practice with the solution determines proper amount to the operator.

Question No. 4. What effect will silver have upon copper solutions, and how can it be removed?

Answer. It was thought that if enough silver entered the copper solution that action would be as ruinous to the copper solution as in a gold solution. The way it could be removed was to add a little sulphurette of potassa to copper or run hydrosulphide gas through the solution.

Question No. 5. A buff weighs 5 lbs. when in still condition on spindle of buff machine. What is the pressure it will have running 3000 R.P.M. if it runs true?

This question was unanswered. (Help.)

Question No. 6. How many ozs. of chloride of silver can be made from 25 ozs. of old anodes or metallic silver?

Answer. It was stated that about 32.5 ozs. chloride of silver could be obtained and method was to use atomatic weight of silver 107 and fraction computed as 108 and add chlorine weight which is 35 = 142 and multiply by 25 the unknown and divide this by 108 or atomic weight of silver which, roughly estimated, means about ¾ oz. solid metal to 1 oz. of chloride.

Question No. 7. What is a good formula for a black solution for plating on silver to take the place of oxidyzing? Something that will relieve easily?

Answer. 8 oz. double nickel salts, 2 ozs. sulpho-cyanide and 2 ozs. zinc cyanide, dissolved in sodium cyanide to gallon and use a brass anode.

Question No. 8. What is cause of tank now used for copper solutions receiving a deposit when there is no connection or ground on the tank?

Answer. It was suggested that cathode on this might touch the bottom of the tank and current migh follow line of least resistance, causing coating to appear. Remedy: Wood lining between anodes and tank; also porcelain insulators on the cathode and anode rods.

Question No. 9. What is best method of nickel-plating die castings composed of 87% zinc, 8% tin and 1% copper and balance aluminum?

Answer. Clean in weak alkaline solution after washing in gasoline or benzine, then run in any neutral or near neutral nickel solution to which has been added 2 ozs. of sulphate of magnesia.

Question No. 10. What is the cause of black nickel solution flaking?

Answer. It was thought that too high a currest when plating direct on brass would cause it, and it was stated that a good method to keep black nickel in near neutral state was by addition of carbonate of zinc.

Question No. 11. In electrolytic analysis of nickel solution what causes platinum anode to become blue during process, no manganese or copper being present?

Answer. This question was not answered. (Help.)

Meeting of March 12th.

Question No. 1. Please explain reason for a deposited metal adhering to the base?

Answer. It was thought that there was a vacuum caused in depositing that held deposit to article being plated, as explained in a former issue of "Metal Industry."

Question No. 2. Will use of carbon disulphide in a silver solution cause deposit to tarnish quicker than the deposit from a bath that does not contain carbon disulphite?

Answer. No.

Question No. 3. Wanted—A formula for a zinc sulphate solution. What voltage is required and how many amperes per square foot?

Answer. 2½ lbs. zinc sulphate, 3 oz. magnesium sulphate, 2 oz. boracic acid, 2 oz. sodium sulphate and use 3 to 4 volts and about 18 to 20 amperes.

Question No. 4. What is specific gravity of 26 per cent commercial ammonia?

Answer. About .890.

Question No. 5. What voltage is used on a copper voltmeter of 1 gallon capacity?

Answer. At about 10 amperes per square foot, ½ volt.

Question No. 6. Wanted—A formula for a zinc cyanide solution. About what voltage is required? How much cyanide is required and is it used hot or cold?

Answer. 2½ oz. sodium cyanide, 3 oz. zinc cyanide, 3 oz. caustic soda. 10 to 12 amperes per square foot, and use at about 120° to 140° F.

Question No. 7. Why does brass deposited on steel show no sign of blisters when taken from the solution, and then blisters when plunged in hot water?

Answer. It was thought that difference in expansion between the two metals might do it, and it was also stated that solution with excess of cyanide and poor in metal would operate likewise when used with high current on tempered steel.

Question No. 8. By accident, 4 gallons of a bright dip came into a 400-gallon nickel solution. The deposit is dark, how can I make it lighter?

Answer. Either work it out by additions of ammonia, or recover salts by additions of ammonium chloride. Either way is expensive and slow and never worth while. Better make new solution.

Question No. 9. Is a concentrated solution of nickel a better conductor than a dilute solution?

Answer. Yes.

Question No. 10. Have a number of small parts to clean and would like to clean and copper at the same time. What is the best method?

Answer. Use regular copper caustic cleaner, hot, using mechanical barrel made out of Georgia pine, which, it was stated, would last a long while if allowed to soak in running, clean, cold water each night after day's work to kind of rinse out soda which seems to destroy these barrels.

CHICAGO BRANCH.

Question. What is conceded the proper abount of "free cyanide" in a hot copper solution?

Answer. A hot copper solution containing 3 ozs. of metal per gallon, 1¾ ozs. of "free cyanide" per gal. was considered to be proper.

TORONTO BRANCH.

INDIANAPOLIS CONVENTION.

June 29-30, July 1-2—Claypool Hotel.

Convention committees are busy sending out requests for papers, exhibits, publicity and "booster committees," also giving such information as requested. Let every Secretary realize the importance of these communications and be prompt.

The request for papers is not only to those members who attend meetings, so if you and Ed Heil are located out of meeting town, just notify the Secretary that you have something good on a plating subject and want to be on the best program a convention ever had, and the Barrows-Ormsby combination will tell the world.

Plan for the exhibit also, read Dayton and St. Louis reports. The Secretary of Indianapolis Branch is Louis Mertz, 1725 Union street, Indianapolis, Ind.

PROF. LANGDON'S ADDRESS.

At the Chicago banquet Prof. S. C. Langdon of the Northwestern University told in detail of the investigation that he, with M. A. Grossman, conducted at the Bureau of Standards last year on "The Embrittling Effects of Cleaning and Pickling Upon Carbon Steels." A copy of the "Summary" was published in the July, 1920, Monthly Review. The inside information he gave was appreciated.

ELECTRO-PLATING.

Electro plating's a funny trade,
A very curious game;
For when a plater lets go of a thing
It never looks quite the same.

He makes the iron look just like brass,
The brass resembles gold.
He electroplates sheet iron with zinc,
And makes the darn stuff hold.

With silver he covers brass forks and spoons,
So you'd think they were silver all through;
He uses up chemicals, acids and such,—
Emery, buffs and glue.

He makes castings black or he makes them white,
He takes scale off with a pickel;
He camouflages all sorts of things
With a bright, shiny coating of nickel.

He turns metals any finish you want,
And sometimes a finish you don't;
But he can't make the polishers work full time.
'Cause he knows very well they won't!

He plates, he polishes, lacquers and buffs,
Of rust he's the deadliest foe;
But he shouldn't make buffers work buffs down too small
The supply man needs the dough!

HEDLEY RICHARDS.

NOTE—It is easy to see that our poet is not responsible for buff conservation. He views it in a different way than he did in a former poem.—Editor.

WHAT THE BRANCHES ARE DOING.

Chicago.

Meets second Saturday of each month, 8 p. m., at the Briggs House, Randolph and Wells Sts., Secretary, Frank J. Hanlon, 2855 N. Richmond St., Chicago, Ill.

Regular meeting held March 12th. Had a nice attendance. We elected one applicant. Also received two applications for membership.

The President then appointed the committee to take charge of the public installation of officers and ladies' night to be held between our May and June meetings.

Mr. Schulte of Pittsburgh Branch dropped in on us with a lot of wit and took part in discussions.

The Librarian had following Questions in Box (see Successful Methods).

Cincinnati.

Meets on the first and third Friday of each month at 1262 State Ave. Secretary, W. J. Husing, 729 McMakin Ave., Cincinnati, O.

Our regular meetings are being very well attended and with increased interest, since we started our class in chemistry at the High School, which also is well attended and opportunity appreciated.

Cincinnati would not stand for being outshined by St. Louis, New York or Rochester Branches, and since the ladies have got their rights, "we had them" with us and naturally had the best banquet yet. It was held in the Y. M. C. A. dining room, where a most excellent feast was had. We were entertained by Herbtrees Entertainers. It is summed up in these words, "Three solid hours of pleasure and good eats."

We regret to report the death of T. R. King, who died suddenly on March 10th. He was a faithful worker for our Branch.

Dayton.

Meets first Saturday of each month at the Y. M. C. A, Dayton, Ohio. Secretary, Alphonz Lamoureux, 432 E. Second St.

The March meeting of Dayton Branch was very well attended and those present were given a treat as Mr. Suman had his paper on "The Use of Hydrofluoric Acid in a Nickel Solution." This paper was augmented by a chart prepared by Mr. Suman, which showed the extent of the experiments as he had conducted them, checking up the weights of deposit on each test and comparing same against a standard nickel solution. These experiments proved very interesting to all those present and as Mr. Suman will have his paper and chart at the convention, we will not say any more at this time.

Our April meeting will be in the nature of a "booster" meeting to arrange for attending the convention, also to make up a Dayton exhibit. From present indications, same will be very elaborate and I should say that Indianapolis will have to reserve space for the boys from the Gem City.

Boston.

Meets first and third Fridays of each month, 8 p. m., at the American House. Secretary, A. W. Garrett, 37 Dorset St., Dorchester, Mass.

Boston Branch met at the Amercan House Friday, the 18th, changing from the Quincy House, President Mackie in the chair.

Going through the regular order of business, two applications were received for membership and referred to the Board of Managers, and two were elected to membership. The report of the banquet committee was one of progress, as there are returns to be made. The first report will be made at the next meeting. A motion was made to make Prof. M. De Kay Thompson of M. I. T., Honorary President of Boston Branch.

Boston Branch held its meeting Friday, March 4th. After the regular order of business, the election of officers was taken up. It had been postponed from January 7th. The following officers were elected: President, J. J. Nihan; Vice-President, Louis A. Gale; Secretary-Treasurer, Andrew Talamona; Recording Secretary, Andrew W. Garrett; Sergeant-at-Arms, Edward J. White; Librarian, H. H. Whitcomb; Board of Managers, Thomas J. McShane, Chairman, Francis Mackie, Ralph E. Barnstead, Philip Nelson and Sam Herrick. After the election President Mackie gave another one of his lessons in chemistry. All should be present, as the lessons will help a great deal in the plating room.

Bridgeport.

Meets third Friday of each month in its laboratory, 260 John St., Bridgeport, Conn. Secretary, Louis J. Maraffi, 744 Hancock Ave., Bridgeport, Conn.

Our February 18th, 1921, meeting was held in the laboratory with fifteen members present. President J. M. Dunn presided.

The minutes of the previous meeting were read and accepted, and all bills were ordered paid.

One applicant was elected to membership.

The chair appointed a committee to make arrangements for having gas installed.

Mr. Eggleston of Pittsburgh gave a short talk of the doings of the Pittsburgh Branch, after which a general discussion was held on the using of porcelain enameled plating racks; and also on different methods of stripping plating racks after they become too thick for use.

Newark.

Meets first, third and fifth Fridays of each month, 8 p. m., Foresters' Home, 20 Central Ave., Newark, N. J. Secretary, O. F. Carlson, 225 West Grand St., Rahway, N. J.

Cleveland.

The Cleveland Branch meets every second and last Saturday of the month at 1344 *East Prospect St. Secretary B. F. McCormick,* 1941 *West 77th St.*

Our meetings this year have been well attended and the members have shown much enthusiasm in the work at hand. The discussions have been full of "pep." (That's a good conductor for platers' meetings.) But we will reserve the papers presented and the discussions for the Cleveland Number of the Monthly Review, which we are informed will be the June issue.

At a recent meeting Mr. Scott gave an exhibit of an ivory enameled lamp base.

Indianapolis.

Indianapolis Branch holds its business meeting the second Saturday in each month at Hotel Denison. Secretary, Louis Mertz, 1725 *Union St., Indianapolis, Ind.*

Regular meeting held March 12th was presided over by President Hennessey. Attendance fair. One member was reinstated as active member. It was moved and carried that we tender a vote of thanks to The Metal Industry for their gift of the 1920 bound volume of The Metal Industry. A reception committee for the convention was appointed with H. C. Warner, 20 Gladstone Apartments, East Washington Street, Indianapolis, Ind., as chairman. The reports of the various committees on convention work show they are on the job and progressing nicely. A question was asked as to what caused a cyanide of copper solution to produce dark streaks on the work with no copper in the streaks, the solution run cold in an iron tank. The theory advanced was the steel hub caps being plated, being hard to drain, carried the acid dip into the copper, killing the cyanide content.

Pittsburgh.

Meets every first Saturday at 8 *p. m. at United States Bureau of Mines Building, Forbes St. Secretary S. E. Hedden,* 227 *5th St., Aspinwall, Pa.*

Meeting of March 5th was called to order by Vice-President A. Kantrowitz, owing to the absence of President John Corbit. The banquet committee reported that the banquet would be held in the Seventh Avenue Hotel, Saturday evening, April 16, and that arrangements were being made for a very enjoyable evening. After the banquet committee finished their report, Mr. Edgar Cornell addressed the members present upon his work in platinum plating, which he has so far carried on to success. He had several samples of his work that had a very heavy deposit. His work along this line has taken up considerable time and as platinum is a very expensive metal, all could appreciate what his work meant.

One new member was elected.

Detroit.

Meets first Friday in each month at Cass Technical High School, Platers' Classroom, 2nd Avenue and Beech Street, at 8 p. m. Secretary, E. G. Lovering, 3719 Grand River Avenue, Detroit, Mich.

Regular meeting of the Detroit Branch March 4th, with Vice-President Brockway presiding. We had a fair attendance, considering the general business conditions in Detroit at present. After the regular routine of business had been disposed of, Mr. Fritz demonstrated his ability by performing on a 14-inch buff, as we have installed in our class-room a full equipped plating and buffing plant. Mr. Fritz tore into the work on hand like an old-time shiner. Prof. Phillips conducted an experiment with a single nickel solution and magnesium sulphate. The experiment was to see if it increased or decreased the conductivity of the bath.

Mr. Woodmansee then gave us a talk on his experiments with the magic fluid nickel and the results he is obtaining. Good work, Elmer, keep it up. You will have "Old Dad's" smile broadening into a grin and the next time we go to Chicago we might stir up something besides a night shirt.

Mr. Phillips, of the Inland Motor Products exhibited a strip of nickel, 6x12 inches, electro deposited .0005, and a perfect strip of nickel close grained and free from pin holes. "Excellent, Mr. Phillips." First thing you know you will have them watching the Detroit Branch.

Our next experiment in the laboratory will be with nickel solution for plating die-cast metal. Detroit Branch is of the opinion that a movement should be started to standardize all die-cast metal that has to be plated so the plater will know just what the metal is that he is called upon to plate.

New York.

Meets every second and fourth Fridays of each month at the Broadway Central Hotel Parlors, New York, N. Y. Secretary, John Burke, 110 Glen St., Brooklyn, N. Y.

President Sterling presided at the February meetings of New York Branch. Two applications for active membership were received and referred to the Board of Trustees. The educational value of Dr. Blum's, Prof. Madson's and Mr. G. B. Hogaboom's discussions concerning the electro deposition of metals at the banquet's afternoon session was highly complimented.

The following plating problems were lengthily discussed: The production of the Swiss gun metal finish, metal cleaning and the composition of a black-dip solution for red brass and bronze.

Discussions on the following papers were indulged in:

"A Minimum Current Density in Commercial Silver Plating," by Mr. Moson. "Factor of Importance in Silver Plating," by F. C. Mesle.

Grand Rapids.

Meets on the second Wednesdays of the month at Vocational High School, 129 Bostwick Ave. Secretary, J. B. Hawley, 1317 Jefferson Ave., Grand Rapids, Mich.

Meets on the second Wednesday of each month at the Vocational High School, 129 Bostwick Avenue. Secretary, J. B. Hawley, 1317 Jefferson Ave., Grand Rapids, Mich.

Grand Rapids Branch held their annual banquet on February 26th at the Livingston Hotel. It was an informal and quiet affair. We had as guests both our management and our assistants, both being well represented.

After eating many good things prepared by order of our committee, Chairman Poe introduced President Allen as Toastmaster.

Speeches were made and articles read by Assistant Superintendent John Saur of Kieler Brass Company; ex-President of Grand Rapids Branch Fitzsimmons; Mr. Weift and Mr. Warner.

Mr. Rickson passed a very good specimen of statuary bronze finish round the table and comments made and questions asked about it.

The party broke up at 10 P. M., everyone having enjoyed a good time.

The committee in charge were Mr. Poe, Chairman; Mr. Whalley, Mr. Hawley and Mr. Weift.

Philadelphia

Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. Secretary, Philip Uhl, 2432 North 29th St., Philadelphia.

Philadelphia Branch met Friday, March 4th, with the regular order of business.

Three applicants were elected to active membership and one application was received.

Mr. Geo. Reif gave a very interesting talk on "The Refinishing of Cash Registers."

The following questions were brought up:

Does steel work rust easier when copper and nickel-plated than it does when nickel-plated?

Is chloride in a nickel bath harmful to the deposit?

What is the best method to remove japan from automobile radiator frames?

These questions brought forth interesting discussions, all present taking part, especially Messrs. Bar, Benoliel and Gehling. Mr. Benoliel, whom we were glad to see again after his absence, explained on the blackboard the various actions of the chemicals under discussion.

It was decided that hereafter the annual banquet of the Branch be held the latter part of November.

Milwaukee.

Meets first Friday of each month at West Side Bank Building. Secretary, A. W. Ruttan, 1105 Twenty-eighth St., Milwaukee, Wis.

Our Branch held the regular meeting on March 4. Two new members were elected to membership. After the regular routine of business, the visiting members were called on for speeches.

Questions were then in order and discussions followed.

A member who recently took charge of a plating department said the nickel solutions were made up of a prepared nickel salts and they were not working right. He was considering throwing them out and making up a single nickel solution so he could plate faster. Another member then said he had better results with a one-half double and a one-half single, as the single salts was a non-conductor and more power would be used to get the same amperage.

The hydrometer then came in for its share of criticism. One member said he has not used a hydrometer in five years, as the various combinations have a tendency to have some effect on the reading. Another said they were good, but only when making up a new solution. And just think back a few short years. The plater who did not use his hydrometer at least once a day was considered a reckless plater.

Our membership in the American Electro-Platers' Society has made a better plater of me, and I think it has of every member.

Providence-Attleboro.

Meets first and third Thursdays of each month at 26 Custom House Street, Room 16. Secretary, Clayton J. Poyton, 269 Ohio Avenue, Providence, R. I.

On March 10th we held an open meeting in Providence. Dr. Albert Claflin of Providence and President Mackie of the Boston Branch addressed the gathering. The attendance was large and a very interested audience listened attentively to the speakers.

After giving an outline of the aims of the Society, Dr. Claflin introduced Mr. Francis Mackie. As a thoroughly practical man, the speaker was there. The speaker cited numerous cases of the old-fashioned methods, such as testing cyanide by tasting, trying other solutions by smelling, etc. As one of the objects of our open meeting was to acquire new members, the attention of those present who were not members was called to the many advantages of associating with the Society. At the conclusion of his remarks a spontaneous response was given to the Chairman's request for a rising vote of thanks. The privilege of asking any questions gave Mr. Mackie a very busy half hour.

Some of the questions and answers may prove interesting reading:

Question. What advantage has any of the many formulas for nickel-plating over the old one used for many years: three-fourths double salts and some common salt to the gallon?

Answer. For many kinds of work, NONE.

Question. What causes brass plated tinplate to turn milky color after two months' standing?

Answer. Only reason feasible that brass plate was too thin.

Question. What is good solution for brass plating; to have deposit stay bright?

Answer. 3 oz. copper carbonate, 1 oz. zinc carbonate, 1 oz. free cyanide and as a brightener, 20 pwt. of yellow prussiate of potash to 1 gallon. Run for 1 hour, 14 amperes per square foot.

Question. What method can be used to keep sterling silver from tarnishing without the use of lacquer?

Answer. No such finish known.

Question. What is the best method of removing scale from white metal?

Answer. A 10% solution of muriatic acid will remove the scale and leave work perfectly free.

Question. What causes replated white metal work to peel and blister?

Answer. All plate from old pieces should be removed with a 10% solution of cyanide of soda or potash, which does not injure work and takes all plate.

Many thanked Mr. Mackie for his liberal answers, and after many exchanges of ideas amongst those present, our very successful meeting came to a close.

Our next meeting will be held in Attleboro March 17, and the subject for discussion will be "Nickel-Plating."

St. Louis.

Meets first Saturday of each month at Barr Branch Library, corner Jefferson and Lafayette. Secretary, H. H. Williams, 4156 *Botanical Ave., St. Louis, Mo.*

We had a very good attendance at our March 5th meeting. C. S. Weygandt presided. Reports were made by E. J. Musick regarding the visit to Indianapolis banquet and by F. E. Terrio on the New York banquet. Both were very interesting.

It was decided to appoint a "Convention Booster Committee," this committee to interest St. Louis members and friends in planning to attend the Indianapolis convention, plan for exhibits, take care of details and give information. The Presdent appointed the following committee: E. J. Musick, F. E. Terrio, C. McGinley, H. Deubelbies and G. Lamkemeyer.

Eleven members have already signified their intention of attending.

"Oxidizing and Coloring of Metals" was the subject for the evening. Mr. J. H. Hartman had an exhibit of a great variety of plated and dipped finishes, and read a paper giving method used to produce them.

Mr. J. H. Jordan also had exhibit which included several spray finishes as well and gave formulas and told of his experiences. By vote these members were thanked for their frankness and desire to answer every question and were requested to have these exhibits at Indianapolis. These papers will appear in the St. Louis number.

The subject for April 2nd is "Silver and Gold Plating," with papers by E. W. Mueller, E. J. Musick and Chas. Fischer.

A vote of thanks was given to the publishers of The Metal Industry for the bound volume of 1920, presented to the St. Louis Branch.

Toronto.

Meets second Thursday of each month at Occident Hall, Bathhurst and Queen Streets. Secretary, Chas. Kemish, 271 Boston Avenue, Toronto, Ont.

The February meeting of Toronto Branch was presided over by President Thos. O'Keefe.

Two applications for active membership were received.

Members of the platers' class have been very consistent in their attendance at the Toronto Technical School and are bending all their efforts to tasks set down for them. Not always meeting with success at first attempts, they are more determined than ever and try again.

The work set out for the class is the determination and separation of metals in solution, which is very interesting. About one and one-half hours of the evening is devoted to this work and the balance of the evening is taken up with a lecture pertaining to the fundamental principles of electro-plating and also touching on a little organic chemistry, which embodies solvents, soaps, glucoses, etc., which are used in the art of plating. The members are rather keen on these lectures which they say are altogether too short, but this cannot be helped.

Report for March 10th.

Regular meeting of Toronto Branch was held on March 10th, Vice-President Wm. H. Cresswell presiding. Two applications for active membership were received. A bound volume of The Metal Industry for 1920 was donated to Toronto Branch by the Publishers, which was greatly appreciated and was placed in our library for the benefit of our members.

The Librarian was given power to purchase a few more books which may prove of interest to the electro-plating industry and add them to our collection.

The platers' class at the Toronto Technical School were given a practical demonstration of the Marsh test of the separation of metals by Dr. J. F. Mackey, honorary member of Toronto Branch, who pointed out the results which would occur if not carried out properly, also showing us a properly carried out test. The members of the class, along with their instructors, received an invitation from the instructor in photography to face the camera and by sheer good luck it came out good. The last one I was in my face slipped, so I was given fair warning this time, not to move a muscle. I obeyed.

Considerable discussion arose from questions put forth, such as: What caused a voltmeter to register 3/10 of a volt in a silver plating tank, anode rods being submerged and a silver anode hung on cathode rod, generator not running? It was stated it may be due to local battery action set up.

Why does a nickel-plated cold water tap in kitchen turn dark and nickel-plated hot water tap does not? Suggested that it may be due to the "sweating" of the cold water tap and absorbing the gases from the atmosphere. This is going to be tested out by one of the members.

Connecticut Valley.

Meets at Hartford, Conn. Secretary, Jas. A. Bagshaw, 39 *Grand St., New Britain, Conn.*

Rochester.

Meets on the fourth Fridays. Secretary, Sylvester Gartland. 128 *Bryan Street, Rochester, N. Y.*

Toledo.

Toledo Branch meets 1st Thursday night each month at Toledo University Science Building, Electro-Platers' Room, corner Cherry and Page Sts. H. L. Myers, 410 *Palmer St., Secretary.*

APPLICATIONS FOR MEMBERSHIP.

Boston.

L. Gilberti.....53 Clifton St., N. Cambridge, Mass.
W. Simonetti.....72 Newberry St., Somerville, Mass.

Chicago.

Ellsworth Widerick.....1212 S. Oakley Blvd., Chicago, Ill.
Fred Langer.....2439 Lexington St., Chicago, Ill.

New York.

Benjamin Cross.....256 Division Ave., Brooklyn, N. Y.
Thomas S. Stretch.....109 E. 116th St., New York, N. Y.

Philadelphia.

D. J. Kathbone (active)..2658 N. Colorado St., Philadelphia, Pa.

Toronto.

Chas. E. Beltz.....Eagle House, Weston, Ontario
Frank H. McIlwen.....13 Bloem Ave., Toronto, Ontario
G. J. Youngs.....347 Huron St., Stratford, Ontario
W. W. Young.....13 Brunswick St., Brentford, Ontario

Waterbury.

Wm. Aschoff.....Thomaston, Conn.
W. F. Guilfoile.....30 Cook St., Waterbury, Conn
J. A. Messick.....185 Woodlawn St., Waterbury, Conn.
W. J. Gray...Care of Waterbury Buckle Co., Waterbury, Conn.

ELECTED TO MEMBERSHIP.

Boston.

Wm. H. Lee.....5 Action St., Boston, Mass.
R. C. Barmstead.....45 Burt St., Dorchester, Mass.

Chicago.

C. Juneau.....476 Fulton St., Aurora, Ill.
J. H. Clapp.....3149 Lowe Ave., Chicago, Ill.

Grand Rapids.

R. J. McMeekin.....Wyoming Park, Grand Rapids, Mich.

Pittsburgh.

G. Newman.....1309 East St., Pittsburgh, Pa.

Philadelphia.

W F. Asimus.....6612 Hegerman St., Philadelphia, Pa.
P. Spies.....622 Scott St., Stroudsburg, Pa.
F. T. Grabrylowitz.....812 Noble St., Philadelphia, Pa.

RE-INSTATED.

Bridgeport.

G. Hopkins...Care of Apothecaries Hall Co., Waterbury, Conn.

Indianapolis.

Wm. Lamoureux.....1906 Meridan St., Indianapolis, Ind.
Henry Martin.....1129 S. Main St., Kokomo, Ind.

DIED.

Dr. Wm. A. Jones.....New York Branch
T. R. King.....Cincinnati Branch